

THE HORNED LARKS OF NORTH AMERICA.

BY JONATHAN DWIGHT, JR.

SINCE Mr. Henshaw's review of this group six years ago (Auk, Vol. I, 1884, p. 254) his collection of birds has passed into the British Museum. and much of his valuable material has not been available for study in the present connection, but the loss of this has been more than compensated by the immense number of specimens kindly placed at my disposal by many members of the American Ornithologists' Union. Over 1200 were sent to the last meeting of the A. O. U., by request of the Committee of Arrangements, and since then I have examined many others, bringing the grand total up to 2012. Such a magnificent series of birds of one species has probably never before been brought together, and including, as it does, birds from all portions of the continent and at all seasons of the year, it affords a wonderful opportunity for the study of plumage and geographical variation, and at the same time brings one face to face with the question, as yet unsolved, of a nomenclature that, without being cumbrous, will fit the many groups, intergrading one with another, into which the North American genus *Otocoris* is certainly separable. Binomialism, based on the fixity of species, will not suit the Horned Larks, for from the Atlantic to the Pacific, and from the Arctic down into Mexico, I can form a chain of differing groups that, nevertheless, pass insensibly from one to the other, absolutely without break. Trinomialism gives relief, but it does not provide for exactly intermediate specimens, nor does it formulate a rule under which subspecies may be established, but leaves the matter to the varying taste of every student. However, it is not my purpose to discuss nomenclature, and I trust the conclusions I have reached will be sufficiently conservative to meet with the approval of those who have had to deal with the same difficulties.

Accepting trinomialism as it is today, I have applied the following rule to my study of the Horned Larks, *i. e.*, to recognize as races groups of birds that during the breeding season occupy definable areas over which similar conditions of climate and vegetation prevail, and that show differences of size or plumage at the centres of such areas, which may be readily recognized and

clearly described. This brings it down to a question of where to draw the circumscribing lines, and allowing the already described forms to stand as models, I have endeavored to draw them no closer than those laid down by Mr. Henshaw. The excellence of his work, based on 350 specimens, is attested by the fact that my material does little more than support his conclusions, and where I have arrived at different results, it is simply because I have specimens that were not then obtained. In fact I have had too many from certain localities, not enough from others. Breeding examples of the Arctic forms *alpestris* and *leucolæma* are few in number, and as for Mexico, there is next to nothing to show what real *chrysolæma* is. Mr. Henshaw's material only carried him as far south as Arizona and New Mexico, and he naturally supposed that *arenicola* passed into *chrysolæma*, there being nothing to show the existence of the well-marked desert race *adusta* which intervenes. The naming of such intermediate races as *adusta* and the dark race *merrilli* of eastern Oregon, Washington and British Columbia, the only new ones except *pallida* recognized in this paper, may be questionable, but they certainly are as well marked as already existing forms, and as matters stood *arenicola* was an intermediate race between *leucolæma* and *chrysolæma*, north and south, and between *praticola* and *strigata*, east and west. Among the surprises developed by the material before me, is the existence of a form on the eastern slope of the Sierra Nevada Mountains, referable directly to *praticola*. This is discussed under its proper head, and I now wish to call particular attention to two facts which seem to have escaped general notice, and are of great importance in understanding the plumage of birds of this genus. One is the fact that but one moult takes place in the year, the breeding plumage being the result of the wearing away of the tips of all the feathers acquired during the autumn moult. The effect is most striking on the black areas which, clouded and obscured with yellowish tips in the autumn, come out clear and defined in the spring. There is no evidence whatsoever of a spring moult. The other is that young birds in passing from first plumage, which is worn only a few weeks, moult wings and tail as well as the feathers, usually moulted. This fact and change of plumage without moult have not been attributed to the Horned Larks, so far as I know, and only in a general way is it known to be true of other species.

I have endeavored to prepare a key, but where differences are so slight that now and then the individual variation will amount to as much as the varietal, it is almost impossible to formulate descriptions of colors of which no two persons have the same idea. Ridgway's 'Nomenclature of Colors' has been my guide, and typical specimens have been directly compared with the plates of colors in this work. The birds measured have been principally those breeding at points where the races should be typical. The wing measurements of fully three quarters of the series have been roughly taken, and those that were strikingly large or small have received more careful consideration in making comparison with those of normal size and color. Those that were much worn I have endeavored to throw aside, but in some cases they are responsible for the apparently great variation of extremes.

It is not my purpose to treat the subject exhaustively, but merely to contribute to what we already know, the results obtained from a good many weeks' study upon the unexampled series before me. The facts of distribution are graphically represented on the accompanying map. Laboring as I have under the disadvantage of not having visited many of the areas, the study of topography and altitudes, of charts of rain-fall and forest distribution, and of the literature bearing upon the subject, has been imperative in properly understanding the relation of one race to another, and the map embodies my conclusions. The area over which each race may be expected to occur in the breeding season is indicated, the lines approaching closely where the material justifies it, and where it does not I have thought it best to leave considerable intermediate space. The greater the amount of the material studied, the closer together can these lines of arbitrary demarcation be drawn, my object being to include within them breeding birds that differ less from one another than they do from those of an adjacent area. Of course we must not expect to find Horned Larks everywhere, but only over such portions of a given area as are suitable to the birds' taste. To exactly map distribution will be a work of the future, and I hope my contribution to our knowledge of the genus *Otocoris* is only a beginning, and outlines what we may expect to see better done with every species when a sufficient amount of material is gathered. Even that at hand does not suffice to show winter distribution accurately. All the races show a greater or less southward movement at this sea-

son, overlapping and extending their ranges in a very puzzling manner. I am inclined to the belief that the mountain races usually descend to the lower plains, and besides are often urged southward by severity of weather or lack of food supply. *Leucolæma* and *alpestris* appear to leave entirely their summer haunts; *praticola*, and *arenicola* move south over only a part of their summer range; *giraudi*, *rubea* and *strigata* appear to be chiefly resident; and material is still wanting to determine the range of the other forms.

The yellowing and darkening effect of age upon some of the older skins, especially of young birds, is an element of danger to the student of limited series, and is well illustrated by some young *arenicola* which might be easily mistaken for *praticola*, were it not for later material from the same spot.

To all those fellow members of the A. O. U. who have placed material at my disposal my thanks are hereby extended, especially to Mr. Robert Ridgway for the loan of type specimens, to Mr. Wm. Brewster for specimens of *merrilli* and *adusta*, and to Mr. J. A. Allen who has aided me with suggestions and advice.

1. *Otocoris alpestris* (Linn.). HORNE LARK.

Habitat.—Northern Europe, Greenland, Newfoundland, Labrador, and Hudson's Bay region; southward in winter into eastern United States to about Lat. 35°.

The Horned Lark of northeastern North America is characterized at all seasons by its large size, dark colors and yellow eyebrows. The nape, shoulders, and rump are of a pink-vinaceous cinnamon; the white below, dull. In autumn it appears darker and less obviously streaked above, owing to the longer, grayish or pinkish edging and tips of the feathers; the black of the head is much obscured by buffy or yellowish tips, that of the breast less so; the yellow is much brighter, occasionally showing faintly below the jugular crescent, and often suffusing the whole of the upper parts, particularly the head. Young of the year are browner and more spotted, but cannot be distinguished with certainty from the adults. The amount and intensity of the yellow is purely individual, and independent of age, sex or season, but in this bird alone of the group it is always present.

Mr. Henshaw's conclusion that the European bird is identical with ours must stand, unless a good series should prove the contrary. I have seen but two specimens, and can infer nothing from them. They agree in size with our birds; one, a male in autumn plumage from Sweden, is more lilaceous, and that is all the difference observable. Our bird breeds far north of the United States, about the shores of Hudson's Bay, Labrador and Newfoundland, and in winter is found chiefly along the coast of the New England and Middle States, abundant to about Lat. 38°. West of the Appalachian mountain chain it is perhaps less abundant, though occurring, as shown by typical specimens, as far west as Manitoba. A few breeding birds from the Saskatchewan region and winter specimens from the Mississippi Valley, evidently bred in this intermediate region, are better referable to *leucolæma*, though dark and slightly tinged with yellow on the throat.

Average measurements of 11 breeding males: wing, 108.5 mm. (4.27 in.); tail, 72.1 mm. (2.84 in.); tarsus, 23.1 mm. (.91 in.); bill from nostril, 10.2 mm. (.40 in.).

Specimens examined: ♂, 328; ♀, 221; young in first plumage, 6. Localities represented: Sweden, Europe; *Ft. Chimo and *Davis Inlet, Labrador; *Penguin, Is., *Cape St. Mary, and *Canada Bay, Newfoundland; *Moose Fort, Hudson's Bay region; Hampton, N. H.; Ipswich, Revere, Chelsea, Watertown, Newtonville, Duxbury, Chatham, and North Truro, Mass.; Connecticut; Long Island (King's, Queen's, and Suffolk Cos.), Troy and Lockport, N. Y.; Haddonfield, N. J.; Bucks Co., Philadelphia, Carlisle, and Erie, Pa.; Delaware; Washington, D. C.; Raleigh, N. C.; Cleveland and Circleville, O.; Toronto and Rat Portage, Ontario; Ypsilanti, Mich.; Manitoba; Ft. Snelling, Minn.; Mt. Carmel, Ill.; and New Orleans, La.

2. *Otocoris alpestris leucolæma* (Coues). PALLID HORNED LARK.

Habitat.—Alaska and western British America; southward in winter into Western United States to about Lat. 40°.

This appears to be the largest form of all, and when typical shows no yellow. The back is very gray, and the nape, etc., are vinaceous or pinkish vinaceous in the males.

A few breeding birds from the Saskatchewan and Great Slave

*An asterisk denotes breeding birds.

Lake region, though tinged with yellow on the chin, are, on account of size and colors somewhat paler than *alpestris*, referable to *leucolæma*; so too are large dark birds with white eyebrows and pale yellow chins found in winter in the upper Mississippi Valley, coming as they doubtless do from an intermediate region between Hudson's Bay and Alaska. Breeding birds of these two races are few and limited mainly to those taken on Government expeditions; consequently I do not draw the lines on the map as closely together as with some of the other races better defined.

Two young in first plumage taken on the Arctic Coast east of the Anderson River may be referred to this race. While they are not as black and white as might be expected in Alaskan birds, they lack the general yellowishness of young *alpestris* from Newfoundland. In winter *leucolæma* is found as far south as the middle of the western United States, mostly east of the Sierra Nevada Mountains. Northwest coast specimens indicate that a small-sized *leucolæma* may breed in the mountains not far north of the United States boundary, though such birds may generally be referred to *merrilli*. A male in autumn plumage taken Aug. 26, at Chief Mt. Lake on our northern boundary, Long. 114° W., suggests the possibility of this form breeding also on the mountains at that point or not far to the north of it. It is not reported from Pt. Barrow, is rare at St. Michaels, Alaska, and is probably an interior race. A winter example from Long Island, N. Y., shows how far it may stray at that season, though this bird is hardly typical.

Average measurements of 9 breeding males: wing, 111.8 mm. (4.40 in.); tail, 74.7 mm. (2.94 in.); tarsus, 22.4 mm. (.88 in.); bill from nostril, 9.9 mm. (.39 in.).

Specimens examined: ♂, 38; ♀, 24; young in first plumage, 2. Localities represented: *Ft. Youkon and *St. Michaels, Alaska; *Arctic coast east of Ft. Anderson, *Harton River, and *Franklin Bay; *Ft. Reliance, *Ft. Resolution, and *Big Island (Great Slave Lake), Northwest Territory; *Saskatchewan region; Chilliwask. B. C.; Walla Walla, Wash.; Ft. Klamath, Ore.; Carson and Steamboat Valley, Nev.; Camp Floyd, Salt Lake City, and Ogden, Utah; Bitter Root Valley, Sun River, and Chief Mountain Lake, Mont.; La Rivière Lac, Souris River, N. Dak.; Ft. Randall and Vermillion, S. Dak.; Coyote Sta., Emporia, Ft. Riley, and Manhattan, Kan.; and Shelter Island (Long Island), N. Y.

3. *Otocoris alpestris praticola* Hensh. PRAIRIE
HORNED LARK.

' *Habitat*. — Upper Mississippi Valley and region of the Great Lakes.

This bird is a miniature *leucolæma*, somewhat darker, and with a pale yellow chin which is seldom bright, and is often white. Autumn birds seem to show more linear spots on the breast than do the other forms, but this is not a constant feature. It seems to have gradually extended its range eastward as the woods have disappeared, and we can see why it should be nearer to *leucolæma* than to *alpestris*. It has recently been found breeding in Vermont and on Long Island, and either of these localities is a long distance from Hudson's Bay or Newfoundland, and mountains intervene. However, as we go westward we find a direct gradation into *arenicola*, and this race passes directly into *leucolæma*. Now *leucolæma* passes into *alpestris* and somewhere in the Saskatchewan or Winnipeg regions we shall find, I venture to say, breeding birds that might be referred to any one of these four forms. It is birds that have wandered southward from such a point as this that are most difficult to determine, even with abundant material at hand for comparison. In winter *praticola* visits South Carolina and central Texas, though it seems to be largely resident throughout its range and at its northeastern limit in New York is a very early breeder. There are no records of its breeding south of southern Illinois, Missouri, and Kansas, and its western range practically coincides with the line where prairie ceases and plains begin, which is also nearly coincident with the north and south line of twenty inches annual rain-fall, passing through central Manitoba, Dakota, Nebraska and Kansas.

Strange as it may seem, it is a fact that several breeding birds from Carson, Nevada, must be considered of this race. Typical *arenicola* of the arid, elevated region of the Plains and Great Basin grades off to the eastward into *praticola*, a bird of moist, grassy regions, and to the westward into the Carson *praticola*, a bird of the eastern slopes of the Sierras, which are known to have about the same rain-fall as the prairies. The mountains form a barrier to the westward, and there is no intergradation with *rubea*, the race just across them in California. This, fortunately, perhaps, prevents further complication and we may call it a case of

interrupted distribution or consider the bird a dark *arenicola*, but the fact remains that birds breed at Carson which cannot be distinguished from those that breed in New York State. A couple of winter birds from the Mojave Desert might be referred to this form, but are as pale as typical *arenicola*.

Average measurements of 30 breeding males: wing, 103.6 mm. (4.08 in.); tail, 72.6 mm. (2.86 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 9.4 mm. (.37 in.).

Specimens examined: ♂, 159; ♀, 72; young in first plumage, 30. Localities represented: North Truro, Hyannis, and Revere, Mass.; *Long Island City, *Troy, *Alder Creek, *Syracuse, *Peterboro, *Geneva, and *Lockport, N. Y.; *Erie and Philadelphia, Pa.; Washington, D. C.; Arlington, Va.; Raleigh and Weaverville, N. C.; Circleville, O.; Indianapolis, Ind.; *Mt. Carmel, *Richland Co., Adams Co., Mason Co., *Sugar Creek Prairie, *Waukegan, *Calumet, *Riverdale, *W. Northfield, and *Evanston, Ill.; Ann Arbor and *Cadillac, Mich.; Racine and *Dane Co., Wis.; *Toronto, *Peel Co. and Rat Portage, Ontario; *Carberry, Manitoba; *Pembina, N. Dak.; Ft. Snelling, Tintah, and Zumbrota, Minn.; *Lake Mills and *Grinnell, Ia.; London and Papillion, Neb.; *Turkey Creek, *Leavenworth, *Topeka, Manhattan, and *Big Blue River, Kan.; *Missouri; Gainesville, Dallas, and Giddings, Tex.; *Carson and *Franktown, Nev.

4. *Otocoris alpestris giraudi* Hensh. TEXAN HORNED LARK.

Habitat. — Coast region of southern Texas.

Small size and the peculiar light gray of the back distinguish this form at all seasons. There is a yellowish green tinge above in autumn, and at all seasons the yellow of the head is very deep, extending on the breast below the black crescent in a large majority of the males. Without being pallid like *arenicola*, it is strikingly pale, and does not resemble any other race so closely as *leucolæma*. Its peculiarities of coloration, its size, and its isolated breeding range, which seems to be several hundred miles from the nearest forms (towards which it shows no variation), give it strong claims for specific rank, but while material from the intermediate area is lacking, such a course might be premature.

Average measurements of 15 breeding males: wing, 97.3 mm. (3.83 in.); tail, 65.0 mm. (2.56 in.); tarsus, 21.6 mm. (.85 in.); bill from nostril, 9.1 mm. (.36 in.).

Specimens examined: ♂, 31; ♀, 19; young in first plumage, 5. Localities represented: *Brazoria Co., *Wharton Co., *Aransas, Bee Co., *Corpus Christi, and Pt. Isabel Texas.

5. *Otocoris alpestris arenicola* Hensh. DESERT HORNED LARK.

Habitat.—Region of the Great Plains, Rocky Mts., and the Great Basin of the United States, from the northern boundary to about Lat. 34°.

General paleness combined with whiteness below mark this race, distinguishing it from *praticola*; size and yellow chin separate it from *leucolema*; the back is pale, and the nape vinaceous-pink. The yellow is, however, as in the other races, exceedingly variable, independent, I have already said, of age, sex, or season, and may vary from almost white to bright lemon. Still on an average it is brighter in autumn than in summer, and palest in northern breeding birds. Colorado breeding birds differ very little from those of the plains of Montana at lower altitude, but Dakota and Kansas specimens approach *praticola*. Those of the mountains of western Montana approach close to *merrilli*, are darker on the back, and in autumn more suffused with yellow. Specimens of this sort are found at Carson in winter. Birds from the desert region of Utah, near Great Salt Lake, are paler with a reddish cast of plumage similar to specimens from northern New Mexico, Arizona and Western Texas, which are still redder and a little smaller, with yellower throats. Most of these last are the intermediates between *arenicola* and *adusta*, and referable to the latter. Material at hand, particularly young birds, indicates that the birds of the higher portions of Arizona and New Mexico, notably San Francisco Mt., Ft. Verde, Lone Mt. and Albuquerque, are better referable to *arenicola*. Where mountains, forest, and desert are so mixed together that in a few miles one may find all these modifying causes it is not surprising that the birds should prove puzzling.

I have referred the mountain bird of Carson to *praticola*. Probably *arenicola* is the form of the arid region at the foot of the mountains, but there is no material from the Great Basin between Carson and Great Salt Lake to prove this. Winter birds from the Mojave Desert, though small, are referable to this

race, and a Ft. Tejon, Cal., specimen seems to be a connecting link between *chrysolæma* and *arenicola*. The young of this race and the young of *praticola* differ much more than do the adults, *praticola* being very dark brown and *arenicola* very light.

In winter *arenicola* ranges south into Texas and Mexico, though it is probable that many of the birds merely descend from the mountains to the neighboring plains. How far north *arenicola* extends is uncertain. It may be called the form of the Rocky Mountains and adjacent plains, and while it embraces birds of mountain, plain, and desert, the differences between them are so unimportant, as shown by the immense series before me, that I am convinced, unless we go into veritable 'hair-splitting,' one name should stand for all. Local causes, such as latitude, rainfall, and altitude, modify somewhat the average characters of this race, birds breeding on the mountains being slightly larger and paler than those of the lower plains, and the same thing holds true of northern breeding birds as compared with those from its southern limit, but considering the great diversity of the large area over which it is found, the differences are surprisingly small and do not appear to be much greater than the individual differences observable in large series from single localities.

Average measurements of 20 breeding males: wing, 104.4 mm. (4.11 in.); tail, 72.1 mm. (2.84 in.); tarsus, 21.3 mm. (.84 in.); bill from nostril, 9.7 mm. (.38 in.).

Specimens examined: ♂, 395; ♀, 206; young, first plumage, 73. Localities represented: *Heart River, *Fort Union, Ft. Rice, and Dickinson, N. Dak.; *Buffalo Gap, Ft. Tyndall, and Ft. Randall, S. Dak.; *Ft. Keogh, Ft. Custer, Frenchman's River, Porcupine River, Two Forks of Milk River, Sunday Creek, Three Buttes, Dry Horse Creek, *Helena, *Moreland, *Pass Creek, Dry Creek, *Willow Creek, Madison River, Gallatin River, *Hillsdale, and *Rainbow Falls, Mont.; *Ft. Fetterman, Bridger, Laramie and Cheyenne, Wyo.; *Denver, Ft. Massachusetts, Clear Creek. *Colorado Springs, Pueblo, *Fair Play, Central City and *South Platte, Col.; Washoe Lake and Carson, Nev.; Salt Lake City, Santa Clara, Ogden, Beaver, Fairfield, and Kelton, U.; Mojave Desert, Cal.; Wilcox, Ft. Verde and San Francisco Mountain, Ariz.; Zuñi, Santa Fé, Chico Springs, Silver City, Lone Mountain, Mimbres to Rio Grande, Las Vegas, Deming, Ft. Thorn, and Ft. Bayard, N. M.; Chihuahua, Mexico; San Angelo, Concho Co., Comanche, Cook Co., Kendall Co., Giddings, *Pecos City, Ft. Davis, Sierra Blanca, Marfa, Del Rio, and Laredo, Tex.; Beaver River, Tepee Creek and Ft. Reno, I. T.; Garden City and *Ft. Hays, Kan.; and *Valentine, Neb.

6. *Otocoris alpestris adusta*, subsp. nov. SCORCHED HORNED LARK.

Habitat.—Southern Arizona and New Mexico, Western Texas, and southward into Mexico.

SUBSP. CHAR:—Similar to *chrysolema*, but of a uniform scorched pink or vinaceous-cinnamon above.

Adult male in breeding plumage (No. 23,575, Coll. Wm. Brewster, Feb. 21, 1887, Camp Huachuca, Arizona): Above uniform vinaceous-cinnamon, in no contrast to slightly pinker nape, and extending on sides and flanks; fore part of head, 'horns,' loreal stripe, and jugular crescent, uniform black; chin canary-yellow; forehead, superciliary stripe, and posterior ear-coverts white, tinged with canary; rest of lower parts creamy white, reddish-tinged; wings reddish brown, quills whitish-edged. Feet black; bill plumbeous black, lower mandible bluish towards base. Wing, 101.6 mm. (4.00 in.); tail, 71.9 mm. (2.83 in.); tarsus, 20.3 mm. (.80 in.); bill from nostril, 9.1 mm. (.36 in.).

Adult male in autumn plumage (No 23,555, Coll. Wm. Brewster, Sept. 28, 1888, Chihuahua, Mexico,): Above darker and more scorched or rusty than in spring; black areas clouded, and plumage generally softer, otherwise as in spring.

Adult female in breeding plumage (No. 23,588, Coll. Wm. Brewster, March 2, 1887, Camp Huachuca, Arizona): Above reddish cinnamon, streaked continuously from bill to rump-band with darker reddish brown; no crown patch; loreal stripe faintly indicated with dusky; jugular patch restricted; otherwise like the male. Wing, 94.7 mm. (3.73 in.); tail, 63.0 mm. (2.48 in.); tarsus, 19.8 mm. (.78 in.); bill from nostril, 8.6 mm. (.34 in.).

Young, first plumage (No. 116,918, U. S. Nat. Mus., Sulphur Spring, Arizona, Aug. 18, 1874). Above pale reddish cinnamon, dotted on head, neck, and back with small buffy spots, tipping feathers that are dark brown subterminally; wings similar, quills edged with reddish cinnamon; underparts white, spotted lightly across the throat with dusky upon a buffy band. Tail deep brown, outer feathers tipped and edged with reddish cinnamon. This bird is very young, the tail not one third grown. As compared with the young of other races, it is almost identical in appearance with *chrysolema* from Nicasio, California, but the prevailing reddish tints render it easily separable from all the other forms except *chrysolema* and *rubea* of which the series of young is a meagre one, and the constant characters open to some doubt.

The uniform pale vinaceous-cinnamon above, which tinges the creamy white of the lower parts, renders this bird almost unmis-takable. It presents a scorched appearance, the brown more pronounced in autumn.

It may seem questionable to describe a race that is intermediate in characters and habitat between others already known, but, as I have said before, several of the existing races grade into two or three others, and if we admit them we must also recognize others quite as well marked. *Adusta*, I venture to say, is as conspicuous as any, and shows the extreme effect of sun and desert in paling and reddening a bird that otherwise would be a small *arenicola*.

It extends but a short distance north of our Mexican boundary, and is found in winter at Chihuahua, but from lack of material we can only surmise that it will be found in the desert plateau region of Mexico south of our border line, passing into true *chrysolaema* in the fertile valleys to the south. The most characteristic birds come from Camp Huachuca, Arizona, in the spring, but I have others from Ft. Yuma, the Santa Rita Mountains, and Ft. Verde, that are nearer to this form than to *arenicola*. Western Texas birds seem to be larger and much like Great Salt Lake specimens, but all birds from desert regions in Nevada, Utah, Arizona, New Mexico and western Texas, are paler and redder-tinged than those that are found in the mountains, so that the length of wing and intensity of yellow on the chin must also be factors in determining whether they should be referred to this race or to *arenicola*.

Average measurements of 20 breeding males: wing, 102.9 mm. (4.05 in.); tail, 71.4 mm. (2.81 in.); tarsus, 20.8 mm. (.82 in.); bill from nostril, 9.4 mm. (.37 in.).

Specimens examined: ♂, 51; ♀, 30; young in first plumage, 11. Localities represented: Chihuahua, Mexico; *Camp Huachuca, *Santa Rita Mts., *Ft. Verde, *San Francisco Mt., *Oracle, *Willow Spring, *Sulphur Spring, and *Rio Perro, Ariz.; *Ft. Wingate, Zuñi, *Santa Fé, *Albuquerque, and *Lone Mt., N. M.; and *Ft. Davis, *Pecos City, Laredo, and Giddings, Tex.

7. *Otocoris alpestris chrysolæma* (Wagl.). MEXICAN
HORNED LARK.

Habitat.—Mexico, northward along the coast of California to about Lat. 38°.

In this race the contrast between the color of the nape and that of the back is sharp even in autumn, and typically it is a pink cinnamon-rufous contrasting with a sepia-brown back. Autumn specimens are darker, often quite yellowish, and the yellow of the throat is a variable quantity, usually bright. The white below is

clear and rather creamy at all seasons. This race also often has the feathers of the 'knee' yellow.

Although the Mexican material is limited to a few specimens, it suffices to show that while birds from Vera Cruz and the Valley of Mexico average a little larger and perhaps yellower-throated than those from San Francisco, all may be included in the same race. Breeding birds from southern California are often indistinguishable even in size from Mexican examples, and although San Francisco birds are redder and sometimes identical with true *rubea*, the majority are more like Mexican specimens than they are like *rubea*.

The habitat assigned admits *chrysolæma* to California in a narrow belt west of the Coast Range Mountains. Although *adusta* and *pallida* practically cut the habitat of *chrysolæma* in two, material at hand does not show that the Mexican bird is separable. Mr. Henshaw thought the California birds were all *rubea*, and referred Audubon's supposed type of *Alauda rufa* to this form. I have examined it, and refer it to *chrysolæma*, restricting *rubea* to the Sacramento Valley. What may occur in the San Joaquin Valley remains to be proved. A Ft. Tejon specimen is very faded and approaches *arenicola*, as already noted. A winter specimen from Bogotá (described by Sclater as a new species, *peregrina*) is very small, but does not differ appreciably otherwise.

Average measurements of 30 breeding males: wing, 99.3 mm. (3.91); tail, 68.3 mm. (2.69); tarsus, 20.8 mm. (.82); bill from nostril, 9.4 mm. (.37 in.).

Specimens examined: ♂, 90; ♀, 36; young in first plumage, 3. Localities represented: [Bogotá, U. S. of Columbia]?: *Valley of Mexico and *Mirador (near Vera Cruz), Mexico; *San Quentin, Lower Cala.; San Diego, Elsinore, San Geronio Pass, Riverside, *Los Angeles, Pasadena, *Alhambra, Ventura Co., *Santa Barbara, San Simeon, Los Gatos, San José, San Francisco, *Oakland, *Haywards, *Altamont, Stockton, *Nicasio, and *Sonoma Co., California.

8. *Otocoris alpestris rubea* Hensh. RUDDY HORNED LARK.

Habitat.—Sacramento Valley, California.

Bright rufous suffusing the whole plumage and merging into the ruddy brown of the back without abrupt change, distinguishes this race from *chrysolæma*. It averages a very little smaller, and as it is restricted to a small area the geographical variation is slight. Cut off by high mountains from adjacent races north and

east, it does not seem to partake of their characters, and 'intergrades' are few. Though the material at hand only proves that it inhabits the Sacramento Valley between the Sierras and the Coast Range, it is probable that it will be found in the San Joaquin Valley along the western slope of the Sierras as far south as the same conditions of rainfall and similarity of country prevail. It seems to be largely resident. Mr. Henshaw described as his female type of this race (Auk, 1884, p. 267) the female from Santa Rosalia Bay (No. 82,413, U. S. Nat. Mus.) that Mr. Townsend has now referred to *pallida*. It certainly is not *rubra*, and strange to say bears no type label, while No. 83,968 from Placer Co., Cala., is labelled as a type and is a typical female. For the sake of accuracy I call attention to this hitherto unexplained changing of labels.

Average measurements of 13 breeding males: wing, 99.6 mm. (3.92 in.); tail, 69.1 mm. (2.72 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 8.6 mm. (.34 in.).

Specimens examined: ♂, 22; ♀, 11; young in first plumage, 1. Localities represented: *Stockton, *Placer Co., *Yuba Co., Gridley, *Red Bluff, and *Mt. Lassen, Cala.

9. *Otocoris alpestris strigata* Hensh. STREAKED HORNED LARK.

Habitat.—Coast region of Oregon, Washington [and British Columbia?], west of the Cascade Mountains, and Santa Cruz group of islands, California.

This race has credit for more streaking and more yellow than it deserves. By rumpling the feathers of the back of almost any of the other forms a heavily streaked effect may be obtained, and the extreme yellowness below of the type specimens is not supported by the small series I have before me. It is darker than any of the other races except *merrilli*, and, compared with it, is not so broadly streaked, and is browner and more yellowish tinged at all seasons. The nape is of a deep vinaceous-cinnamon while in *merrilli* it is much paler. The yellow on the throat is a little deeper and often tinges the breast, sometimes extending over the whole of the lower parts, but the amount of yellow is a most misleading and variable quantity, as we see in the other races, and I cannot but conclude that the types are birds abnormally yellow. Analogous specimens may be selected from *merrilli*, *giraudi*.

and even *arenicola*. Five spring males from Oregon show very little yellow on the breast, and one of them none. Females are but slightly tinged on the chin.

It appears to be resident in a narrow belt, of heavy rainfall, west of the Cascade Mountains. The line of 44 inches annual rainfall almost coincides with the meridian of 123° down to about Lat. 40° , while east of the mountains the rainfall is only 20 inches. It is also much warmer along the coast, so that it is natural to find the coast birds resident and those east of the mountains migratory. The great number of *merrilli* found in winter in California, as compared with *strigata*, seems to support this idea.

It is to be noted here that, starting in Mexico, the size of the Horned Larks decreases as we go north along the coast, reaching its minimum in *strigata*, while inland it increases reaching its maximum in *leucolema*. *Merrilli* is intermediate in size between *arenicola* and *strigata*, as might be expected. I have not seen young of *strigata*.

Mr. C. H. Townsend has kindly loaned me a series of ten male Horned Larks from the Santa Cruz group of Islands, California, including the type of the race he calls *insularis*. I am much surprised to find his birds practically indistinguishable from Oregon specimens of *strigata*. They are the same size and though averaging a little darker, the nape approaching brick red, some of them can be matched by the few specimens of *strigata*, I have for comparison. I know that as a rule island birds make not only good races, but often good species, and that Oregon is hundreds of miles from these particular islands, but the fact remains that these two forms differ far less from one another than do any two of the other forms that are of the same size. The case seems parallel to that of the Carson *praticola*, and may well raise the question of what constitutes a race. The study of the Horned Larks convinces me that identical races may occur in isolated spots very much like oases in a desert, but it may be that future material will cause me to change my opinion.

Average measurements of 17 breeding males: wing, 98.8 mm. (3.89 in.); tail, 67.8 mm. (2.67 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 9.1 mm. (.36 in.).

Specimens examined: ♂, 18, ♀, 19. Localities represented: *Ft. Steilacoom and *Shoalwater Bay, Wash.; *Salem and Albany, Ore.; Red Bluff, Gridley, Yuba Co., Summit, San Francisco, and *Santa Cruz Islands, Cala.

10. *Otocoris alpestris merrilli*, subsp. nov. DUSKY HORNED LARK.

Habitat.—Eastern Oregon, Washington, and British Columbia, between the Cascade and Rocky Mountains; southward in winter into Nevada and California.

SUBSP. CHAR.—Larger, more broadly streaked above, and blacker than *strigata*, with less yellow about the head and throat, the nape pinker.

Adult male in breeding plumage (No. 19,516, Coll. Wm. Brewster, Ft. Klamath, Oregon, July 1, 1887):—Back dark sepia brown, the feathers edged with pinkish gray; back of head, nape, shoulders, and rump-band vinaceous-cinnamon, the color extending to the sides of the neck and into the white of the breast below the black jugular patch, and faintly along the sides and flanks, which are streaked with dusky; loreal stripe from bill to middle of ear coverts (where it is widest and curves downward), fore part of crown, 'horns', and large jugular patch, uniform black; posterior portion of ear coverts dusky; band on forehead, stripe over eye and rest of lower parts white; eyebrow tinged with yellow; chin bright primrose yellow; wings dark like the back, the quills edged with grayish, the outer web of the first primary white-edged; tail black, two outer feathers white-edged externally and two central feathers brown, darkest at tip, and passing into the color of the rump at their base. Bill, plumbeous black, lower mandible pale buffy at base. Feet black. Wing, 103.4 mm. (4.07 in.); tail, 71.1 mm. (2.80 in.); tarsus, 21.6 mm. (.85 in.); bill from nostril, 8.9 mm. (.35 in.).

Adult female in breeding plumage (No. 19,538, Coll. Wm. Brewster, Ft. Klamath, Oregon, May 23, 1887):—Above broadly streaked with deep sepia brown, the feathers edged with pinkish gray, head more narrowly, and nape but slightly, streaked; nape, etc., paler than in male, the shoulders largely dusky; black jugular patch small and ill-defined; no black cap back of forehead, and loreal stripe only indicated by dusky; chin tinged with primrose yellow; eyebrows and lower parts white. Wing, 94.5 mm. (3.72 in.); tail, 63.5 mm. (2.50 in.); tarsus, 19.1 mm. (.75 in.); bill from nostril, 8.6 mm. (.34 in.).

Male in autumn plumage (No. 18,857, Coll. Wm. Brewster, Ft. Klamath, Oregon, Sept., 13, 1887):—Similar to breeding plumage, but softer, grayer, and pinker, pinkish gray edging of the feathers obscuring the dark color along the shafts as well as the white forehead and black cap; buffy tips cloud the other black areas, and the breast is clouded with dusky spotting below the jugular patch.

Female in autumn plumage (No. 18,852, Coll. Wm. Brewster, Ft. Klamath, Oregon, Oct. 26, 1887):—Similar to breeding plumage, but softer, grayer, and pinker; grayish wash across breast obscurely streaked.

Young in first plumage (♂, No. 19,524, Coll. Wm. Brewster, Ft. Klamath, Oregon, July 1, 1887):—[Described as *strigata*, Auk, Vol. V, 1888, p. 260.] Above brownish black * * * conspicuously varie-

gated with white or soiled white markings * * * ; underparts soiled white, the cheeks and jugulum flecked with dusky, the breast and sides, obscurely spotted with dull black [quoted in part].

This is the blackest-backed of all the races, the dark brown of *strigata* having a decidedly yellowish shade, particularly in autumn specimens, whereas *merrilli* is black-brown in spring and strikingly grayish and streaked in autumn. Sometimes it shows as much yellow as *strigata*, chiefly in autumn specimens, but it is a larger bird, so that size and color combined generally suffice to determine doubtful specimens. Certain pale birds of large size indicate an approach to *leucolama*, and probably come from an intermediate breeding area. The breeding range of *merrilli* includes the eastern portions of Oregon and Washington and the plains of the Fraser River. How far eastward it extends remains to be proved. Birds from western Montana approach this form, having yellow on the breast and darker streaked backs than average *arenicola*, to which form, however, it is perhaps best to refer such specimens. In winter it ranges as far south as Carson and San Francisco. *Merrilli* is certainly intermediate, but so are other races, and as this one is constant over a considerable area, it seems advisable to name it. This, it is only fair to say, Mr. Wm. Brewster proposed to do some years ago, and at his suggestion I name it after Dr. J. C. Merrill, U. S. A., to whose efforts a fine series of specimens is due. (Cf. Auk, Vol. V, 1888, p. 259.)

Average measurements of 20 breeding males: wing, 101.6 mm. (4.00 in.); tail, 69.6 mm. (2.74 in.); tarsus, 21.1 mm. (.83 in.); bill from nostril, 9.4 mm. (.37 in.).

Specimens examined: ♂, 62; ♀, 35; young, first plumage, 11. Localities represented: *Ashcroft, *Kamloops, and Chilliwask, B. C.; Walla Walla, Wash.; *Umatilla Agency, Camp Harney, *Ft. Klamath, Ore.; Carson and Steamboat Valley, Nev.; *Mt. Shasta, Ft. Crook, Gridley, Marysville, and Stockton, Cal.

11. *Otocoris alpestris pallida* Townsend, ms.

Habitat.—Lower California and Sonora. Mr. C. H. Townsend has recently described a race from Lower California and kindly permitted me to examine his type. Mr. W. E. Bryant has also sent me a pair of this race, and informs me that they are typical of others from the same locality. It is the smallest and

most pallid of any yet described, and resembles most a miniature *arenicola*. The white edging of the feathers of the back, particularly the secondaries, is very marked. While material is so meagre it is hardly safe to assign a definite habitat, but this probably represents a desert seashore race. A female, worn and faded, from Tehuantepec is perhaps referable to this race, but I imagine Mexico has still some curious facts to disclose regarding its resident Horned Larks.

Average measurements of 2 breeding males: wing, 95.0 mm. (3.74 in.); tail, 64.0 mm. (2.52 in.); tarsus, 19.6 mm. (.77 in.); bill from nostril, 9.1 mm. (.36 in.).

Specimens examined: ♂, 2; ♀, 2. Localities represented: *Santa Rosalia Bay and *Magdalena Bay, Lower Cala.; *Mouth of Rio Colorado, Mexico.

I conclude this paper with a description of the seasonal differences of plumage applicable to any of the races, a key to the races based on breeding birds, a table of measurements, and a map of North America showing the localities from which I have examined specimens.

COMMON CHARACTERS.

Males in breeding plumage. — Back various shades of brown, the feathers darkest along the shafts and edged with pinkish, reddish, or grayish, corresponding to the tints of the nape, and producing a mottled or broadly streaked appearance; back of head, sides of neck and nape (generally in marked contrast to the back) pinkish, vinaceous, or reddish, extending to the black of the jugulum and along the sides and flanks; shoulders and a band on rump, usually redder than the nape; fore part of crown, erectile 'horns,' a broad loreal stripe, extending wider below the eye into the middle ear-coverts, and a crescentic patch on the jugulum, curving below from shoulder to shoulder, uniform black; frontal band, a broad superciliary stripe, the middle of the ear-coverts (often interrupted with dusky), chin, throat, and remaining lower parts white, usually tinged about the head with yellow which is brightest on the chin and sometimes washes the breast; flanks obscurely streaked with dusky; tibiae like sides or duller, sometimes pale yellow; wings similar in color to the back, rather darker, the quills whitish-edged; tail black, outer web of exterior feathers chiefly white, and color of rump-band shading off into the pale brown of the two central feathers. Bill plumbeous black, lower mandible paling from tip to base. Feet black.

As but one moult takes place in the year (at the end of the breeding season), the breeding plumage is the direct result of the wearing and

fading of the autumn plumage, each individual feather wearing away at the points of least resistance, chiefly the tip. As the feathers of the back are darker at the base they fade least, the yellow ones fade most, while the vinaceous tints of the neck are often deeper in summer than in spring when the grayish tips are longer, consequently :

Adult males in autumn plumage differ from breeding birds only in softer plumage and more blended colors; grayish, yellowish, or brownish tips obscure the whole of the upper parts, producing a grayer or darker, more broadly and indistinctly streaked appearance; yellowish tips obscure more or less the black areas; and dusky tips just below the black crescent produce a clouding or indistinct spotting across the breast. The yellows are much brighter.

Young of the year are usually more conspicuously spotted, washed with buffy across the breast, and browner and darker above, with smaller bills.

Females in breeding plumage.—Smaller than males; black areas more restricted and less clearly defined; streaked continuously above from frontal band to rump-band, lines narrowest on the head and fewest on the nape, sometimes forming a black patch (rarely as distinct as in the most indistinct male) on the fore part of the crown; frontal band often narrow and obscure; shoulders and ear-coverts frequently obscured with dusky; otherwise similar to the male.

Adult females in autumn plumage.—Plumage softer and colors more suffused than in breeding dress, grayish, brownish or yellowish tips obscuring the various areas of color. Brownish wash and dusky spotting on the breast more or less distinct.

Young of the year usually darker and browner above, the breast below the crescent more conspicuously washed with buffy and more heavily spotted with dusky brown.

Young in first plumage.—Above dusky, brownish or buffy, conspicuously dotted from bill to tail with white; wing-quills and coverts edged with buffy; below white, spotted (more or less) across the breast with dusky, often on a buffy wash. This plumage is completely moulted in acquiring the autumn dress which varies but little from that of the adult. The feathers of the back are first replaced, those of the shoulders next, then the wing-quills, beginning with those nearest the body, and when the spotted plumage has nearly all disappeared, the head changing last, the black about the head and then that of the jugular crescent begins to show, and the tail feathers appear last of all. Bill and feet pale yellowish.

KEY TO MALES, BASED ON BREEDING PLUMAGE.

A. Backs grayish or brownish.

a. Colors pale, nape, shoulders and rump-band pinkish; colors generally grayer in autumn.

a'. No yellow anywhere; wing, 111.8 mm. (4.40 in.). *leucolæma*.

b'. Yellow on throat.

- a''*. Back dark, eyebrows always white; colors darker in autumn; wing, 104.1 mm. (4.10 in.). *praticola*.
b''. Back pale; yellow usually brighter in autumn; wing, 104.1 mm. (4.10 in.). *arenicola*.
c''. Back very pallid; wing, 95.0 mm. (3.74 in.). *pallida*.
d''. Back light gray; wing, 97.8 mm. (3.85 in.). *giraudi*.
b. Colors dark, nape, etc., reddish; colors generally darker in autumn.
a'. Browner, less streaked, eyebrows and throat always yellow; wing, 109.2 mm. (4.30 in.). *alpestris*.
b'. Darker, more streaked, eyebrows and throat sometimes white.
a''. Back blacker, nape paler; grayer in autumn; wing, 101.6 mm. (4.00 in.). *merrilli*.
b''. Back yellower, greenish tinged, nape darker; grayer in autumn; wing, 99.1 mm. (3.90 in.). *strigata*.
B. Back reddish; usually darker in autumn.
a. Colors of nape in marked contrast to the back; wing, 99.1 mm. (3.90 in.). *chrysolæma*.
b. Colors of nape merging into those of the back.
a'. General appearance rich rufous; wing, 99.1 mm. (3.90 in.). *rubea*.
b'. General appearance pallid and scorched; wing, 102.9 mm. (4.05 in.). *adusta*.

KEY TO FEMALES, BASED ON BREEDING PLUMAGE.

- A*. Back grayish or brownish; usually darker in autumn.
a. Eyebrow and chin always yellow; dark colors; wing, 101.6 mm. (4.00 in.). *alpestris*.
b. No yellow anywhere; wing, 104.1 mm. (4.10 in.). *leucolæma*.
c. Eyebrow and chin usually yellow, often white.
a'. Back pale gray; wing, 88.9 mm. (3.50 in.). *giraudi*.
b'. Back pallid; wing, 96.5 mm. (3.80 in.). *arenicola*.
c'. Back very pallid; wing, 88.9 mm. (3.50 in.). *pallida*.
d'. Back dark.
a''. Blackish brown, darker in autumn; eyebrow always white; wing, 96.5 mm. (3.80 in.). *praticola*.
b''. Blackish brown, more broadly streaked; grayer in autumn; wing, 95.3 mm. (3.75 in.). *merrilli*.
c''. Yellowish brown; yellower in autumn; wing, 91.4 mm. (3.60 in.). *strigata*.
B. Back reddish, usually darker in autumn.
a. Ruddy-tinged; wing, 91.4 mm. (3.60 in.). *rubea*.
b. Yellowish-tinged; wing, 92.7 mm. (3.65 in.). *chrysolæma*.
c. Pallid; wing, 95.3 in. (3.75 in.). *adusta*.

KEY TO YOUNG IN FIRST PLUMAGE.

- A. Black and white above.
 a. Spotting whiter. *merrilli*.
 b. Spotting more buffy. *leucolæma*.
- B. Dark brown above.
 a. White below, heavily spotted on breast. *praticola*.
 b. Yellow-tinged throughout, less spotted. *alpestris*.
 c. [Probably similar to *alpestris*]. *strigata*.
- C. Pale brown above.
 a. Darker and grayer. *giraudi*.
 b. Paler and browner. *arenicola*.
 c. [Probably similar to *arenicola*]. *pallida*.
- D. Reddish brown above.
 a. Dark. *chrysolæma*.
 b. Ruddy. *rubea*.
 c. Pale. *adusta*.

TABLE OF MEASUREMENTS (IN MILLIMETERS).

No. of specimens.		WING.			TAIL.			TARSUS.			*BILL (from nostril).		
		Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.
MALES.													
25	leucolæma	111.5	115.8	108.0	74.7	78.7	69.3	22.4	23.4	21.1	9.7	10.4	8.4
30	alpestris	109.7	114.8	106.2	74.2	80.3	67.6	23.4	25.4	21.6	10.2	11.2	8.9
30	arenicola	104.9	107.7	101.1	71.9	76.7	64.0	21.3	22.6	19.6	9.7	10.2	8.9
30	praticola	103.9	107.4	99.6	72.9	76.2	68.6	21.1	22.1	19.6	9.4	10.2	8.4
30	adusta	102.9	108.7	99.6	71.1	74.9	68.1	20.6	22.1	19.1	9.4	10.7	8.4
30	merrilli	101.9	104.9	98.6	70.4	73.7	66.0	21.1	22.9	19.8	9.4	10.2	8.4
30	chrysolæma	99.3	104.6	93.5	68.3	72.4	63.5	20.8	22.4	19.1	9.4	10.7	8.4
17	rubea	99.1	104.6	96.0	67.1	71.1	66.0	21.1	22.1	20.1	9.1	9.9	8.1
19	strigata	98.6	101.6	92.5	67.6	71.9	63.5	20.8	22.6	19.3	9.1	10.2	8.1
25	giraudi	96.3	102.6	92.5	65.0	68.6	61.0	21.3	22.4	20.3	9.1	9.9	8.1
2	pallida	95.0	95.3	94.7	64.0	64.3	63.5	19.6	19.6	19.6	9.1	9.1	9.1
FEMALES.													
10	leucolæma	104.6	106.2	102.1	68.3	71.4	62.2	21.6	22.9	20.8	9.1	10.4	8.4
30	alpestris	101.6	104.6	97.5	66.0	70.6	59.7	22.4	23.6	20.8	9.1	10.9	8.4
30	arenicola	97.0	101.6	92.0	64.5	68.6	60.5	20.3	21.6	19.1	8.9	9.7	8.1
30	praticola	97.3	101.1	92.7	65.0	71.9	61.0	20.8	22.1	19.6	8.9	9.9	8.1
20	adusta	95.8	98.6	94.0	63.2	66.6	58.4	20.3	21.1	18.5	8.6	9.7	8.1
30	merrilli	95.5	99.8	92.0	63.5	70.6	59.7	20.3	21.8	19.1	8.6	9.9	7.9
25	chrysolæma	92.5	96.0	89.7	61.2	66.0	57.9	20.1	20.8	18.8	8.6	9.1	8.1
9	rubea	91.4	94.0	89.7	61.7	64.0	58.4	20.3	20.8	19.6	8.6	9.4	7.9
17	strigata	91.7	96.8	89.4	61.0	65.5	57.2	20.1	21.3	19.3	8.6	9.1	8.1
18	giraudi	88.6	92.0	85.1	56.9	60.5	53.9	20.6	21.6	17.8	8.6	9.7	8.1
2	pallida	89.7	90.2	88.9	56.9	57.9	55.9	20.0	20.1	19.8	8.6	8.9	8.1

*Culmen averages about one fifth larger.

Wing measurement is chord from carpal joint to end of first primary.

Tail measurements is from insertion of two central rectrices to end of longest.